

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of directly operating a solid oxide fuel cell having an anode and a cathode, the method comprising:
reacting forming a first mixture comprising molecular oxygen and a compound having formula 1:



wherein R is alkyl, aryl, alkaryl, or aralkyl[[;]] at heating the first mixture to a sufficient temperature of less than about 650°C to form a reaction product second mixture comprising carbon monoxide, [[and]] molecular hydrogen, and a reaction product including R; and
contacting the anode of a solid oxide fuel cell with the reaction product second ~~gaseous~~ mixture to directly oxidize the reaction product including R.

2. (Original) The method of claim 1 wherein the compound having formula 1 is dimethyl ether.

3. (Currently Amended) The method of claim 2 wherein the reaction product including an R group is second mixture further comprises methane.

4. (Currently Amended) The method of claim 1 wherein the molar ratio ~~in the first mixture~~ of molecular oxygen to a compound having formula 1 in the reacting step is from about 0.1 to about 3.0.

5. (Currently Amended) The method of claim 1 wherein the molar ratio in ~~the first mixture~~ of molecular oxygen to a compound having formula 1 in the reacting step is from about 0.1 to about 1.0.

6. (Cancelled)

7. (Currently Amended) The method of claim 1 wherein the sufficient temperature is in the range of ~~first mixture is heated to a temperature of~~ from about 450°C to about 650°C.

8. (Cancelled)

9. (Currently Amended) The method of claim 1 wherein the sufficient temperature is in the range of ~~first mixture is heated to a temperature of~~ from about 550°C to about 600°C.

10. (Original) The method of claim 1 wherein the anode comprises a nickel-containing cermet.

11. (Original) The method of claim 1 wherein the anode comprises a component selected from the group consisting of nickel mixed with gadolina doped ceria, nickel mixed with yttria doped ceria zirconia, or nickel mixed with yttria doped zirconia.

12. (Currently Amended) The method of claim 9 further comprising:
~~wherein the first mixture is formed by~~ combining air and the compound having formula 1 for the reaction of molecular oxygen and the compound having formula 1, wherein the compound having formula 1 is dimethyl ether, the first mixture includes 33% by volume of dimethyl ether, and the sufficient temperature is ~~first mixture is heated to~~ a temperature of about 550°C.

13. (Original) The method of claim 1 wherein R is a C₁₋₆ alkyl.

14. (Currently Amended) A method of directly operating a solid oxide fuel cell having an anode and a cathode, the method comprising:

~~reacting forming a first mixture comprising~~ air and dimethyl ether[[:]] ~~at heating the mixture to~~ a sufficient temperature of less than about 650°C to form a reaction product ~~second mixture comprising~~ carbon monoxide, methane, and molecular hydrogen; and

contacting the anode of a solid oxide fuel cell with the reaction product ~~second gaseous mixture to directly oxidize the methane.~~

15. (Currently Amended) The method of claim 14 wherein the air is comprised of molecular oxygen and the molar ratio ~~in the first mixture~~ of molecular oxygen to a compound having formula 1 in the reacting step is from about 0.1 to about 3.0.

16. (Currently Amended) The method of claim 14 wherein the air is comprised of molecular oxygen and the molar ratio ~~in the first mixture~~ of molecular oxygen to a compound having formula 1 in the reacting step is from about 0.1 to about 1.0.

17. (Cancelled)

18. (Currently Amended) The method of claim 14 wherein the sufficient temperature is in the range of ~~first mixture is heated to a temperature of from~~ about 450°C to about 650°C.

19. (Currently Amended) The method of claim 14 wherein the sufficient temperature is ~~first mixture is heated to a temperature of at least~~ about 550°C.

20. (Currently Amended) The method of claim 14 wherein the sufficient temperature is in the range of ~~first mixture is heated to a temperature of from~~ about 550°C to about 600°C.

21. (Previously Presented) The method of claim 20 wherein the anode comprises Ni-Y₂O₃ stabilized ZrO₂ and (Ce,Y)O₂.

22. (Currently Amended) A fuel cell system comprising:
a source of a first mixture comprising molecular oxygen and a compound having formula 1:



wherein R is alkyl, aryl, alkaryl, or aralkyl;

a solid oxide fuel cell having an inlet, a conduit and an outlet and an anode and a cathode; and

a heat source surrounding the anode and the cathode of the solid oxide fuel cell, the conduit and a portion of the inlet, the heat source heating that heats the first mixture that is situated within the surrounded portion of the inlet to a sufficient temperature of less than about 650°C to form a reaction product ~~second~~ mixture comprising carbon monoxide, ~~[[and]]~~ molecular hydrogen, and a reaction product including R,

~~a solid oxide fuel cell having an anode and a cathode; and~~

wherein the [[a]] conduit for contacting contacts the anode of the solid oxide fuel cell with the reaction product ~~second gaseous~~ mixture to directly oxidize the reaction product R.

23. (Original) The system of claim 22 wherein the compound having formula 1 is dimethyl ether.

24. (Original) The system of claim 22 wherein the molar ratio in the first mixture of molecular oxygen to a compound having formula 1 is from about 0.1 to about 3.0.

25. (Original) The system of claim 22 wherein the molar ratio in the first mixture of molecular oxygen to a compound having formula 1 is from about 0.1 to about 1.0.

26. (Original) The system of claim 22 wherein the second mixture further comprises methane.

27. (Cancelled)

28. (Previously Presented) The system of claim 22 wherein the heat source heats the first mixture to a temperature of from about 450°C to about 650°C.

29. (Cancelled)

30. (Previously Presented) The system of claim 22 wherein the heat source heats the first mixture to a temperature of from about 550°C to about 600°C.

31. (Original) The system of claim 22 wherein the anode comprises a nickel-containing cermet.

32. (Previously Presented) The system of claim 22 wherein the anode comprises a component selected from the group consisting of nickel mixed with gadolonia doped ceria, nickel mixed with yttria doped ceria zirconia, or nickel mixed with yttria doped zirconia.

33. (Cancelled)

34. (Currently Amended) The method of claim 1 wherein the step of reacting molecular oxygen and the compound having formula 1 ~~heating the first mixture~~ produces less than about 10 weight % water and less than about 10 weight % carbon dioxide of the total weight of the reaction product ~~second~~ mixture.

35.-43. (Cancelled)